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Renal denervation for resistant hypertension in an elderly patient despite quintuple antihypertensive therapy: a case report

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ABSTRACT

Hypertension is the leading cause of cardiovascular morbidity and mortality. Renal nerves have critical roles in the regulation of blood pressure and fluid volume, and their dysfunction is closely associated with cardiovascular diseases. The denervation procedure is performed through a renal ablation catheter and has been shown in recent trials to provide impressive blood pressure reductions and a favorable safety profile in drug-resistant hypertension. We present a 78-year-old patient who underwent renal denervation due to unresponse to quintuple antihypertensive treatment.

Keywords: Hypertension, resistant, ablation, blood pressure

INTRODUCTION

Hypertension is the leading cause of cardiovascular morbidity and mortality. Renal nerves have critical roles in the regulation of blood pressure and fluid volume, and their dysfunction is closely associated with cardiovascular diseases.[1] Renal nerves consist of sympathetic efferent and sensory afferent nerves. Activation of efferent renal sympathetic nerves induces renin secretion, sodium absorption, and increased renal vascular resistance, resulting in increased blood pressure and fluid retention.[2] Afferent sympathetic stimuli release epinephrine/norepinephrine from the central nervous system. These stimuli increase renin/aldosterone release from the kidneys and adrenal glands, reduce glomerular filtration and renal blood flow, and increase salt/water retention. Drug-resistant hypertension is defined as BP > 140/90 mmHg despite the use of three or more antihypertensive drugs, one of which is a diuretic. It remains common despite the availability of several classes of effective antihypertensive agents. Sympathetic hyperactivity has long been known to be a major contributor to resistant hypertension, but surgical radical sympathectomy was abandoned several decades ago due to its significant side effects.[3] It has been shown that sympathetic activity increases by 45-60% in hypertension (HT), sympathetic activity decreases after renal denervation (RDN), and systolic/diastolic blood pressure decreases exponentially. The newly developed minimally invasive catheter-based method aims to partially block the renal sympathetic nerves. The denervation procedure is performed through a renal ablation catheter and has been shown in recent trials to provide impressive blood pressure reductions and a favorable safety profile in drug-resistant hypertension.[4] Although the long-term effectiveness and safety of renal denervation have not yet been determined, emerging data suggest that the benefits of renal denervation may extend beyond blood pressure control. Renal denervation studies continue to reveal a strong antihypertensive effect, especially in studies where drugs are discontinued subsequently.[5]

Herein, we present a 78-year-old patient who underwent renal denervation due to unresponse to quintuple antihypertensive treatment.

CASE

A 78-year-old female patient, who had been followed up for HT in the last 15 years, applied to our outpatient clinic because her blood pressure remained high in recent years despite a multi-drug treatment for HT. The patient presented with complaints of intermittent headache, shortness of breath, tinnitus, and fatigue. Her office BP measurement was 180/95 mmHg. The 24-hour ambulatory BP measurement was 168/105 mmHg during the day and 155/97 mmHg at night. Sinus rhythm and left ventricular hypertrophy findings were noted in the current ECG. An EF of 60%, hypertrophic interventricular septum, and diastolic dysfunction were detected in the ECHO. On physical examination, S1 and S2 heart beats were found to be displaced laterally, and +1 peritibial edema was observed. The drugs she took regularly were Ramipril 10 mg, Amlodipine 10 mg, Bisoprolol 10

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mg, Furosemide 40 mg, and Doxazosin 8 mg. The reason spironolactone was not used in the patient's treatment is due to the patient's lack of response to previous diuretic treatments and the side effect profile(hyperkalemia). Additionally, secondary causes of hypertension were thoroughly evaluated, with particular consideration given to conditions like primary hyperaldosteronism, which are challenging to diagnose based on clinical findings.No renal artery stenosis was detected in the renal Doppler USG performed. There were no findings suggestive of secondary hypertension.

We planned a renal denervation procedure for our patient. After light sedation, we placed a 6F sheath into the femoral artery under local anesthesia. We cannulated the right renal artery with the JR4 guiding catheter and obtained images of the renal artery and its branches. We reached the distal part of the renal artery and its branches with a soft-tipped 0.014 mm wire. With the renal denervation catheter, the distal branches of the renal artery with a diameter greater than 3 mm, the bifurcation point, the junction of the renal artery, and the renal artery in the abdominal aorta were ablated one by one. (Figure) Then, left renal artery angiography was performed. With the renal denervation catheter, the bifurcation points of the renal artery branches with a distal diameter greater than 3 mm and the abdominal aorta/renal artery ostium were ablated. Then the renal denervation catheter was removed, both arteries were checked with angiography, no complications such as dissection, rupture, embolization, etc. were observed, and the procedure was completed successfully.

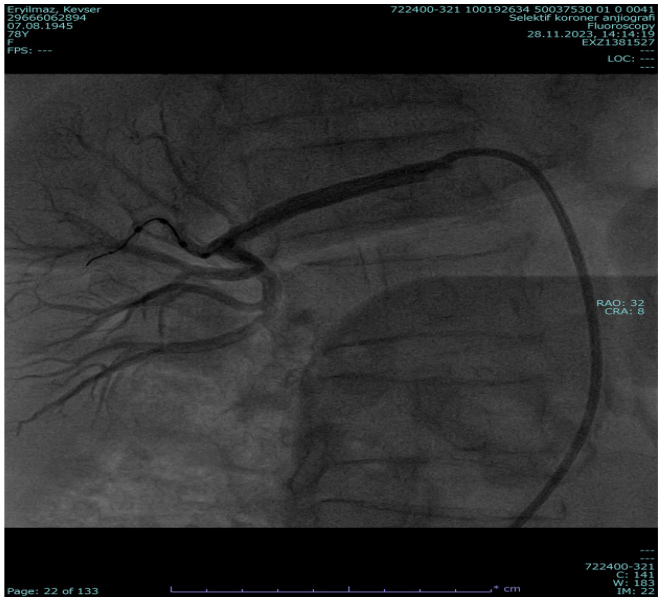

Figure. Image during the renal denervation procedure

DISCUSSION

Approximately 12% of patients with essential hypertension are considered refractory to conventional therapy, whose blood pressure remains persistently elevated despite the use of three or more pharmacological agents. Catheter-based RDN, a modern incarnation of a historically effective therapy, has recently emerged as a new treatment strategy. Subsequently, randomized data of BP reduction collected while using the Symplicity® catheter (Medtronic Inc. Minneapolis, MN, USA) in a group of patients taking an average of five antihypertensive medications at months 1, 3, 6, and 12, respectively, showed office BP decreases of 20/10, 24/11, and 25/11 mmHg. Early blood pressure decreases after RDN have been reported in some cases. However, in other cases, the response does not always appear immediately or may take several months to appear. The role of RDN in the treatment of resistant hypertension remains unclear, but the sustained and dramatic BP reductions observed in these and other cases should stimulate further research to improve understanding of the mechanisms mediated by hypertension and to identify patients likely to achieve the most dramatic responses with RDN.[3] In our case, we performed renal denervation for essential hypertension resistant to regular and quintuple antihypertensive treatment and gradually discontinued the antihypertensive drugs afterwards. At the 1st month follow-up, the ambulatory systolic blood pressure value decreased by an average of 25 mmHg.

Recent studies have discussed the long-term efficacy and safety of RDN. However, there is a need for more extensive studies involving larger patient groups and long-term follow-ups. This case study aims to contribute to filling this gap in the literature.[6,7,8]

CONCLUSION

Renal denervation can be an effective option for patients who have resistant hypertension.

ETHICAL DECLARATIONS

Informed Consent

The patient signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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